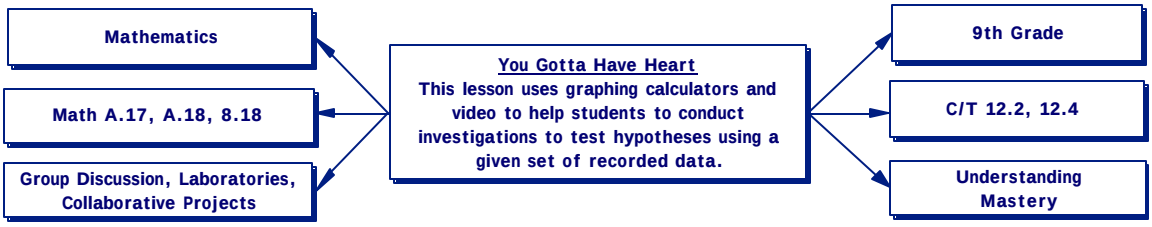

You Gotta Have Heart

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Curriculum Area	Mathematics
Subject Area	Algebra I
Grade Level	9th grade
Learning Objectives	• The student will be able to describe and represent relations using tables, graphs and rules. • The student will be able to analyze a given set of data for the existence of a pattern, and, if possible, determine if it is a function. • The student will be able to write an equation to find the line of best fit. • The student will be able to conduct investigations in which variables are defined and investigations are designed to test hypotheses. • The student will be able to conduct investigations in which conclusions are formed based on recorded quantitative and qualitative data.
Correlation to the SOL	Math A.17, A.18, 8.18 Science BIO.1, BIO.2 C/T 12.2, 12.4
Video/Technology Hardware/Software Needed	**For class:** Television Monitor and VCR **For each group of 4 students:** TI-83 Graphing Calculator **Video:** *The Inside Story with Slim Goodbody #1: Lubba Dubba: The Inside Story of Your Heart and Blood.*
Materials Required	**For each group of 4students:** A copy of the You Gotta Have Heart worksheet One 12 oz. can of soda (caffeine free) One 12 oz. can of soda (high-caffeine, such as Mountain Dew, Jolt, Surge) 12 ozs. of tea (Black Tea, caffeinated) One 2 oz. chocolate bar (such as Baby Ruth) Stop watch or wrist watch Evaluation rubric

Procedures/Activities	1. Assign students to cooperative groups. Have each student take his/her own heart rate. Instruct students to find their pulse at the wrist or on their neck below the chin. (Allow students time to find their pulse and discuss what they feel.) 2. Each group will use a stopwatch or a watch with a second hand to count the number of beats in 10 seconds and multiply by 6. Assign numbers to each person in the group. Have #1 take the heart rate of #2, then change the order until all have had their heart rate recorded. 3. After the students have finished, gather them back together to calculate their resting heart rates. (Suggestion. Have student find their rate three times, then find the average.) Remind them to count the number of beats in 10 seconds and multiply by 6. (This is a resting heart rate. The normal heart rate is about 70 - 72.) Allow students to discuss the purpose of the heart rate, and how the data is important to a doctor. During the discussion on heart rate, ask each group to explain why some people have a different heart rate. 4. Have students view the video *The Inside Story with Slim Goodbody #1: Lubba Dubba: The Inside Story of Your Heart and Blood* to gather more information about the heart. 5. Have a student from each group explain a linear equation, a system equation, a histogram, and a box-and-whisker. Ask, "What type of graph best describes the heart rate?" 6. Give each group one 12-oz. can of soda (caffeine-free), one 12-oz. can of soda (high-caffeine), 12-oz. can of tea, one chocolate bar, and a watch with a second hand or a stopwatch. While gathering their data, the students should record data on the You Gotta Have Heart Worksheet. 7. Have 1 person in each group choose a substance to test. Each group should use l unit of each substance. Have all students consume their test substance at the same time. After waiting 5 minutes repeat steps to calculate their heart rate. Subtract original reading from new reading. 5 min. Reading_____ Normal rate_____ Increase_____ Record the amount of increase over the original reading. Repeat this procedure 5 more times and record data. 8. Have the groups use the TI-83 graphing calculators and input in L_1 the number minutes after consuming the substance and in L_2 input the number of beats of the heart taken at each 5-minute interval. 9. After data is input into the calculator and before the students graph the data, ask, "What kind of graph will this data create? What happened to the graph as the heart increased its pulse rate? Will this type of linear equation always have similar data for each student? Will the substance have the same reaction for all students?" Be aware that some students will have trouble reading their pulse or reading another student's pulse. (Student response will vary based on their knowledge of the heart and their reading of the graph.) 10. Once you have the data, input the data in the List File. Make sure the y= window is clear, Standard Window. Turn the Stat Plot off if using an 82/83 graphing calculator. Make a histogram showing the heart rate increase (use averages) for each substance. For example, if the average heart rate increase for soda increase was 5, you would enter 2 for x and 5 for y for the soda. 11. Ask students, "Based on the results of the test done, which substance increased the heart rate the most? Which group had the greatest increase in heart rate? Overall, which substance caused the greatest increase in heart rate? Were there any other contributing factors that could have altered your results? How could you make this test more accurate?" 12. Next ask students, "When using two-variable data, was a linear regression the line that best fit the graph?" Ask students to note the slope, the y-intercept,

	and the x-intercept. 13. After each group has completed their data, if time permits, create a master chart from all data in the class.
Content Assessment	See the attached rubric
Technology Integration Assessment	See the attached rubric.
Extensions	**Science:** Have students learn more about factors that effect the heart. **History:** Have students research the statistics showing the rate of heart attacks over a period of time. Have them speculate on the increase.

You Gotta Have Heart Worksheet

Substance_____

x	5 min	10 min	15 min	20 min	25 min	30 min	highest
y							

Substance_____

x	5 min	10 min	15 min	20 min	25 min	30min
y						

Substance_____

x	5 min	10 min	15 min	20 min	25 min	30min
y						

Substance_____

x	5 min	10 min	15 min	20 min	25 min	30min
y						

Substance	Group 1	Group 2	Group 3	Group 4	Group 5	Avg.
Tea						
Soda Caffeine						
Soda N.Caffeine						
Chocolate						

Predict Equation

Group Equation

(Optional)Histogram

Box - n - Whisker
Linear Equation; correlation and LSR
Comparison of Graphs
Central Tendency
Compare Standard Deviation
Norm Probability

You Gotta Have Heart
Evaluation Rubric

A	**B**	C	**D**	**E**
Datasheet is complete with accurate information for each problem and group data	Datasheet is complete with accurate information for each problem and group data	Datasheet is complete with accurate information for each problem with a few minor errors	Datasheet is incomplete with some inaccurate information	Datasheet is blank or filled with inaccurate information for majority of each problem
Student correctly identifies the major components of a function	Student correctly identifies the components of a function	Student correctly identifies some of the components of a function	Student correctly identifies some of the components of a function	Student incorrectly identified major components of a function
Student is competent with graphing calculator and explanation of data	Student is competent with graphing calculator and explanation of data	Student is competent with graphing calculator	Student is minimally successful with graphing calculator	Student is incompetent with graphing calculator
Student analysis of data has a correlation of 95%	Student analysis of data has a correlation of 90%	Student analysis of data has a correlation of 80%	Student analysis of data has a correlation of 75%	Student analysis of data has correlation of 69%